



The Aeronautical Newsletter of the  
**Seattle Flight Standards District Office**

1601 Lind Ave., SW, Suite 260  
Renton, WA 98055  
[www.faa.gov/fsdo/seafsdo/](http://www.faa.gov/fsdo/seafsdo/)

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March – April 2001

### **PRACTICAL DENSITY ALTITUDE**

This series continues with more thoughts from Kurt Anderson, NTSB accident investigator. Kurt probably has more insight into what pilots know about the affects of Density Altitude than any other active investigator in the World.

In the November/December issue we told you about Deadly Sin Number Two which dealt with how the turn radius increases with increasing Density Altitude. That story inspired some letters from readers.

Dear Orville:

The November/December issue of AeroSafe continues the discussion of density altitude. I note that the discussion on the second page provides an example of an airplane's radius of turn as a function of TAS and highlights quite nicely the possibility of a pilot in a high Density Altitude situation being mislead into thinking that a smaller radius of turn is possible when it actually is not. However, I worked through the math and by my calculations the turn radius at 180 knots is 2,877 feet and not the 3,240 feet stated in the article. Thus the Density Altitude turn radius is 877 feet more than the Sea Level turn radius and not the 1,250 feet more as

stated in the article. So, the Density Altitude turn diameter is actually 1,754 feet larger than the Sea Level turn diameter and not the 2,500 feet as reported in the article. Also, I calculate the percentage of turn diameter increase to be 44 per cent, not the 61 per cent provided in the example. Am I confused here?

David Auth

Dear David:

While this might be explained away by reference to a metric conversion or some obscure theory of calculus, there is actually a much simpler explanation. The truth is, we messed up. Your figures are exactly correct and ours were wrong. While the increase is less than we originally reported, it is still significant and the fact remains that pilots are waiting too long to start the course reversal. Do it early, before the canyon narrows. Ya'll be careful, and thanks David.

Orville.

Dear Wilbur:

In the November issue of AeroSafe, a reader told of a situation he faced when departing Winnemucca, NV in a Cessna 152. There was about 6 miles between the airport and a 3,200 foot peak. The man was attempting to climb at best rate of climb speed. Shouldn't he have been using best angle of climb speed?

Ryan L. Richardson

Dear Ryan:

We received quite a number of questions like yours. Your misconception is a common one. In fact, it is one of the Deadly Sins that we were going to cover later, but we might as well cover it now.

You will never, **never**, **NEVER** see your AeroSafe staff climbing at Best Angle unless it is **ABSOLUTELY** necessary to do so. And the only time it is absolutely necessary to do so is when climbing toward an obstacle **WITH NO MANUEVERING ROOM WHATSOEVER**. If there is enough room for an S-turn, or a 180, or a 360, or any other combination of turns, We're going to be climbing at Best Rate. When you have maneuvering room, you have the luxury of using Best Rate and you're not stuck with Best Angle.

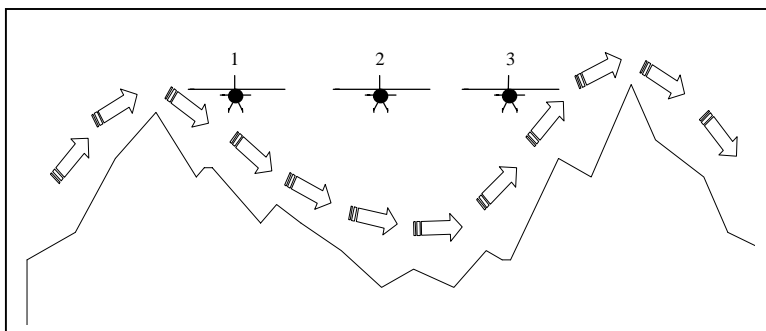
Instructors tell students to use Best Angle of Climb Speed to clear obstacles. This is generally good advice. Best Angle gives you the most altitude for the distance traveled. But a lot of students come to the conclusion that Best Angle should be used for ALL situations requiring obstacle clearance. Not so. There are some serious drawbacks to using Best Angle. For instance, a full power climb at Best Angle requires that the nose of the airplane be up so high that you can't see

where you're going, making "See and Avoid" virtually impossible. Also, at such an attitude, there is little margin for error between Best Angle and stall! Get that nose just a little too high and it is only seconds to disaster! All this while still close to the ground and with an obstacle ahead. Additionally, engine cooling is reduced during climbs at Best Angle. Finally, if the engine even coughs with the nose that high, you're in a World of hurt.

We recommend that you, never, **never, NEVER** climb at Best Angle in situations where Best Rate will do. If there is room to climb straight ahead at Best Rate and clear the obstacle, use Best Rate. If there is room to maneuver while climbing at Best Rate and clear the obstacle, maneuver and climb at Best Rate. You will only see us climbing at Best Angle when it is absolutely necessary to do so, and then, only if we are proficient and absolutely certain we know the attitude that will produce Best Angle of Climb speed for the given density altitude. So, we think the pilot of the 150 in the November issue was correct in selecting Best Rate, he simply did not know what Best Rate of Climb speed was under the prevailing density altitude conditions.

Orville

Which brings us to Deadly Sin Number Four – The misapplication of the information presented in the drawing below.



Probably every pilot has seen this drawing at least once. It comes with an official explanation that goes something like, "Flying in the vicinity of a ridge results in downdrafts for the pilot of airplane 1. Airplane 2 might escape the downdrafts, but a course reversal either to the right or to the left would leave little maneuvering room between the airplane and the ridge. Airplane 3 takes advantage of free lift from the up slope airflow and retains the advantage of an into the wind escape route".

The official explanation is technically correct but it does not go far enough. Since it is questionable whether or not airplane 2 can complete a 180 degree turn, we can assume this valley is not very wide. Most pilots choose to fly up the correct side of the valley (airplane 3 in this case), but push on too far before deciding to reverse direction.

As long as things are going well for airplane 3 the pilot continues bravely on course. It's only when things get tight that the pilot of airplane 3 decides to make the 180. But turning around at this point results in a radius of turn which places the airplane somewhere between airplanes 1 and 2. This is precisely the valley location described in the official explanation as an area of downdrafts!!! The trap has been sprung. Another aircraft smacks the terrain, and generally with fatal results.

**If** you are going to fly through such a valley or canyon (you won't see your AeroSafe staff taking such a risk unless there's a destination airport in the valley) you must decide to make the 180 degree turn while the valley is still wide enough to complete the turn **using less than half of the valley!** You've got to avoid the area of the valley left of airplane 2. Too many of us are not.

Our search and rescue friends offer the following advice. If you absolutely, positively must fly in the valley, never fly **up** the valley. Stay high, familiarize yourself with the terrain, descend into the high end of the valley, and fly **down** the valley.

Thanks Kurt.

## WINGS

The FAA's Pilot Proficiency Awards Program (WINGS), is an excellent way to brush up on the essentials of flight. With WINGS we are encouraging pilots to establish and maintain their own annual refresher training program. WINGS is a voluntary program, you participate only if you choose to. But if you complete WINGS, you have automatically fulfilled your Biennial Flight Review responsibilities, and you receive a pair of wings similar to military flying wings. Also, there are aviation insurance companies who will give you a break, because there is no question, those who do annual refresher training are a better risk than those who do not..

To qualify for your WINGS you must attend an FAA sponsored safety seminar and get three hours of refresher flight training from the instructor of your choice. For airplane pilots, the three hours of training include one hour of landings,

one hour of instrument (either in an airplane or in a simulator), and one hour of maneuvers.

We have the same WINGS for pilots of helicopters, sail planes, ultralights, and balloons. The three hours of flight training are modified to suit the type aircraft.

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## WINGS WEEKENDS

WINGS Weekends consist of on sight seminars, and flight instructors who have volunteered to provide the three hours of instruction at no cost to you (you must provide the airplane). At a WINGS Weekend, you can show up, attend a seminar, get the refresher flight training, and wear your Wings home. *To participate as a pilot, you must be current and qualified to act as pilot in command because you will be the pilot in command, and the instructor will not!!!*

Thanks to the enthusiasm and hard work of our friends at the Paine Field Chapter of the Washington Pilots Association, a Wings Weekend is planned for Everett on the weekend of April 28 and 29.

Maintaining the ratio of pilots to flight instructors is critical, so **PRE-REGISTRATION IS MANDATORY!!!** Whether you are a pilot looking for training or a flight instructor willing to volunteer, please contact Bobbie Jo Brandli at 206-686-1957 or [bj@brandli.com](mailto:bj@brandli.com) to register. Be sure to indicate which day you would like to fly and your return phone number.

We encourage participating pilots to consider tipping their volunteer flight instructors.

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## CASCADE MOUNTAIN FLYING

You are invited to a Saturday seminar at the Skagit Regional Airport on the subject of flying the Cascade Mountains. The seminar will include hints, tips, and techniques for flying our favorite mountains as well as some advice on dealing with Density Altitude problems. The seminar takes place on April 14 and will run from 10 am to 11 am in the hangar immediately **west** of Chuckanut Aviation.

While you're there, enjoy the Skagit Airport Support Association Tulip Fly-In which runs from 10 am to 4 pm. The fly-in will run Saturday only and will feature military as well as general aviation aircraft. For further information contact Julie Hubner at 360-766-7820 or at [juliehub@sos.net](mailto:juliehub@sos.net)

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## OASIS OR MIRAGE?

On September 18, Seattle Automated Flight Service Station inaugurated a major computer upgrade. We call the new Windows-based computer system OASIS. A key design feature of OASIS is its use of commercial-off-the-shelf equipment and programs. As a result, some elements of this new system are still being refined.

One issue of particular interest to instrument pilots is the manner in which OASIS is currently programmed to process IFR flight plans. It is possible that a LAT/LONG fix may be inserted in your routing without your knowledge.

When an IFR flight plan is filed with a direct route segment that crosses ARTCC boundaries, OASIS inserts the LAT/LONG for the first filed fix outside of the departure center's

boundary. For example, if you file a route as SEA direct DEN, the computer would converted it to SEA direct 3952N/10440W direct DEN, where 3952N/10440W is the LAT/LONG of Denver International Airport. The routing is not changed, per se, but you might find that your clearance includes a LAT/LONG that you did not request, and that neither you nor the controller know that the LAT/LONG simply represents the first filed fix outside Seattle ARTCC airspace.

When filing an IFR flight plan with Seattle AFSS which includes a direct route segment that you think might cross ARTCC boundaries, verify with your briefer the LAT/LONG, and anticipate the inclusion of such a LAT/LONG in your clearance.

At present, only those IFR flight plans filed with Seattle AFSS are affected. To learn more about this issue, or to learn more about the new OASIS computer system, pilots are encouraged to contact the Seattle AFSS Watch Supervisor at 206-764-6609 to request a visit or tour.

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## REMEMBER

### Noise Annoys.

**Please do what you can.**

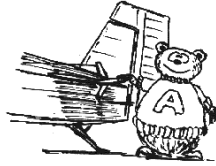
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## ADDRESS CHANGE?

The Address list is stored in a BIG computer at the Home Office in Oklahoma City. They are the ones to notify of any address changes so we can continue to bring you AeroSafe and other good stuff.

FAA Airman Certification Branch  
Box 25082  
Oklahoma City, OK 73125

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